

# **Kentucky Agricultural Experiment Station**

**University of Kentucky**

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## **BEEKEEPING FOR BEGINNERS**

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### **Beekeeping for Beginners**

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Beekeeping has been practised for not less than 3,000 years, but it is remarkable how little is known about the art at the present time by the majority of civilized and more or less educated people. A great deal of information about bees has been gathered in books during these years, and in the hands of specialists and commercial beekeepers the art has been developed to an exactness and nicety not surpassed by any other branch of agriculture, using the word in its broad sense. During the past fifty years, perhaps, more progress has been made in the art in this country than during all the preceding centuries of our history. This has been the result largely of the invention by Langstroth in 1851 of a hive with movable frames. Previous to his time hives had been made of plank, when they were known as box hives, or of sections of hollowed-out trees, the so-called bee gums of the early settlers. These box hives and bee gums have persisted in many parts of Kentucky until the present time, and now constitute our most serious handicap to successful beekeeping. If we could get rid of them all tomorrow, the bees being transferred to Langstroth hives, beekeeping would be immeasurably advanced in the State both as a business and as an avocation or diversion. Bees kept in boxes or gums are no longer profitable in many parts of the State even as a means of supplying the table of the owner with honey. The reason is that with the spread of bee diseases, unknown here when the country was settled, it has become impossible to protect the bees or to disinfect them when once disease invades such hives; and the bees when not destroyed outright, contaminate all others of a neighborhood. Moreover, the comb and brood cannot be inspected, so that the owner never knows its condition, whether the colony has

stores sufficient for its needs or not; whether or not it has a queen. In a new country, with the hives of each farmer some miles away from those of his neighbors, and with no foul brood or other dangerous disease about, gum and box hives served the very moderate needs of a family. Present conditions make necessary watchfulness and care on the part of the beekeeper, and his only refuge from absolute failure in most situations is the adoption of modern practices, together with the movable-frame hive and other up-to-date devices that go with it.

The first step, therefore, for the beginner is to provide himself with a movable-frame or Langstroth hive. These hives are not "patent hives," as sometimes supposed, and are so simple as to be easily made by any carpenter, or by the beekeeper himself if he has some knack for carpentry. For most people it is best to buy of a reliable manufacturer of beekeeping supplies. The making of hives and their parts is so systematized by them, and the parts and joints are so exactly made that the manufactured hive goes together nicely and everything about it fits snugly.

#### THE MOVABLE-FRAME HIVE

What is a movable-frame hive? It is a box with a removable top and bottom, of such dimensions that it will receive 8 or 10 movable frames (8 by 17 inches inside), placed in it side by side so close together that the bees must put their combs in them and yet leave a little room between. To encourage building the combs true and parallel some artificial foundation made of wax is secured in each frame. It will be seen that combs in such frames can be removed when desired and the honey extracted, or a frame or two can be taken from a strong colony and given to a weak one or, again, half of the combs, brood, bees and honey, may be taken from a colony and two colonies be made of it. There are thus many conveniences in handling bees resulting from the use of movable frames; others will occur to any beekeeper as he acquires experience with them.

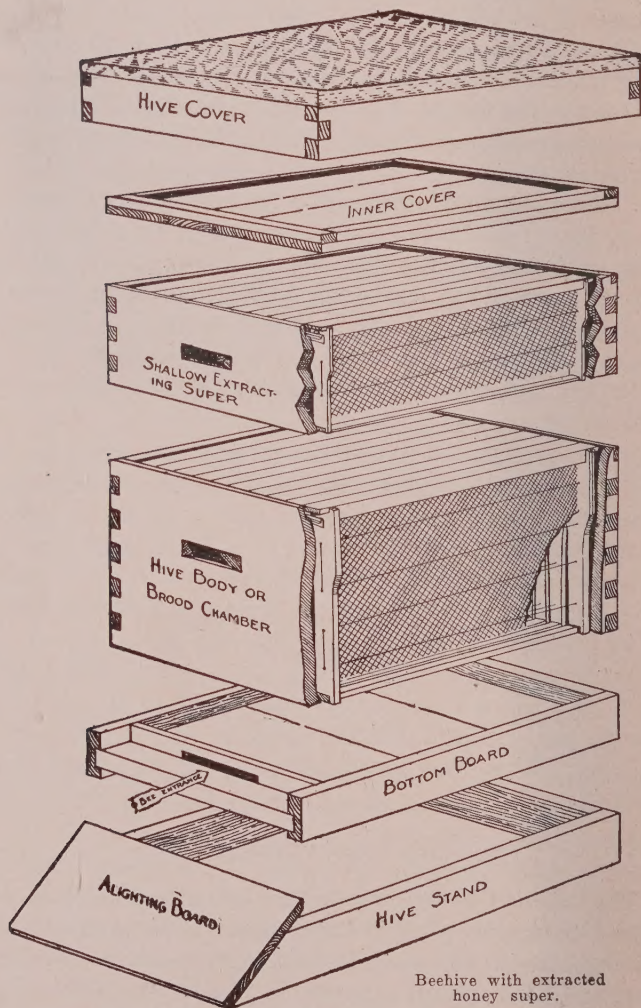
A 10-frame hive is one in which ten frames exactly alike fit snugly in it without waste space. This number of frames

is about right for most beekeepers. It provides enough space for brood rearing and the storage of honey for the support of a strong colony. It is not too heavy when full of brood and honey to be lifted about. On an average bees do as well in a hive of this size as they do in any. A woman, not very strong, may object to the weight of a 10-frame hive when full of honey, and as each frame may contain 8 to 10 pounds, some strength is required in moving the hives, especially when the apiary is large. For most women who take care of their bees themselves, perhaps the 8-frame hive is better because of its lightness, but general testimony is to the effect that the larger hive gives better results in honey. Some beekeepers, indeed, now favor frames of larger than standard size. The beginner need not concern himself about matters of this sort. A standard Hoffman frame is best for him and, generally speaking, the 10-frame hive is what he should get.

It is especially important in starting to obtain the very best supplies on the market. They should be bought of a dealer or manufacturer of good reputation and he should be selected with the purpose of afterward using only his make of hives and accessories. Two different manufacturers may be about equally good. Both may make Langstroth hives and Hoffman frames, yet the beekeeper is likely to find that the hives, supers and frames are not so closely alike as to fit one to the other exactly, and in the rush of a honey gathering season, it is exceedingly annoying and wasteful of time to have to stop and fit parts to each other. Hives, supers and frames of the same make should fit exactly.

#### EQUIPMENT FOR THE BEGINNER

The beginner should buy at least two complete hives, with frames, tops, bottoms, 2 supers with pound sections, if he wishes to produce section honey, or 2 additional hive bodies with ordinary frames, if he wants extracted or chunk honey. Even if he expects to go into the business eventually it is best to start with a few bees, not more than a half dozen colonies, two or three preferably, and extend his apiary as he learns how to manage it.



Beehive with extracted  
honey super.

Fig. 1.—A dissected hive. (By courtesy of the A. I. Root Company).

He is more likely to fail and become discouraged if he goes into the business too deeply and with all his resources at the start. Beekeeping, like any other business, requires some knowledge and experience, and both can be acquired quicker and to better purpose on a few colonies than on a large number. The following equipment should be on hand, the hives and frames put together and ready for use before getting the bees. This equipment should be bought "in flat," that is not put together, the fitting and nailing to be done by the beekeeper.

1. 3 hive bodies, 10-frame size.
2. 30 Hoffman frames.
3. 3 metal, telescoping hive tops.
4. 3 hive bottoms.
5. 60 two bee-way sections with solid divisions boards, or plain sections with fences.
6. Full sheets of vertically wired foundation for each frame.
7. Light foundation for sections.
8. 1 board with bee escape.
9. 2 or 3 wooden inner covers.
10. 2 hive stands—these can easily be made by the beekeeper, but perhaps it will be best at first to get the ready-made, as they are neater, and will save time.
11. 1 bee veil.
12. 1 smoker.
13. 1 drone or queen catcher.
14. 1 spool piano wire, No. 30.
15. A hive tool for separating frames. A cheap screw-driver will answer the purpose.

This material or its equivalent should be on hand ready for use when the bees are received, or when they are ready to be transferred if they have already been obtained in box hives.

#### BUYING BEES

When supplied with the right sort of hives the bees to put in them may be bought, if they are not already on hand. Colonies in box hives may be obtained cheaply in many localities. Most

of them will prove to be black bees or mixtures of these and Italians. They should be requeened as rapidly as possible with Italians. In some neighborhoods most of the bees are now crosses. They are good bees for honey gathering, but not the best, and it is well to get them only as a start. One should be

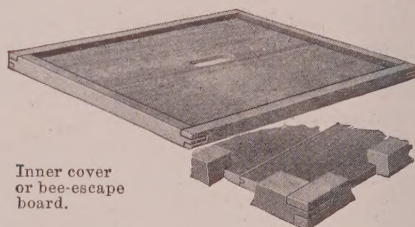


Fig. 2.—The wooden inner cover, with hole in the center for a "bee escape." (Courtesy of the A. I. Root Company.)

exceedingly careful not to buy bees of any sort that are affected with foul-brood. For the beginner diseased colonies are not cheap at any price, since he is not capable of dealing with the disease until he has had some experience in the ordinary operations of beekeeping. To attempt to learn the art with diseased bees is very likely to lead to complete discouragement and failure. It is well to lift the hives offered for sale to see if they have any stores. If very light and few bees are present they should not be purchased. There is always a possibility that they have no queens. This should be looked into. Colonies should never be bought without careful inspection. Spring is the best time to buy.

#### TRANSFERRING BEES FROM BOX TO MOVABLE-FRAME HIVES

An old practice is about as follows: Take the box hive, with the bees to be transferred, a little distance from other hives and place a movable-frame hive containing full sheets of wired foundation on the old stand. If old combs in movable frames are on hand some of them may be used in the new hive with the foundation. After puffing smoke into the box hive so that the bees will fill themselves with honey, turn it bottom side up and place an empty box over the upturned bottom, then drum reg-

ularly and continuously for about ten minutes on the sides of the box hive with a couple of rather heavy sticks or clubs, so as to drive the bees up into the box. When the greater part of the bees have gone into the box they may be shaken out before the movable-frame hive, when they will go in at the entrance. If the queen is seen at this time her wings may be clipped, or she can be removed and a better queen be substituted. It is important to have a queen of some sort with the bees, otherwise they may come out of the new hive. By this time the workers will be in such a disturbed condition that they will receive a new queen readily. The combs can now be cut out, after prying off one side of the box, and either be fitted in movable frames or else the honey and wax may be rendered and used. If they are empty, very old, and black, it is just as well to get rid of them at this time, but if they contain much brood or honey they should be put into movable frames.

#### TRANSFERRING WHEN A SWARM ISSUES

A good time to transfer bees is when a swarm comes from the box hive. When indications of swarming are observed place a queen catcher over the entrance and as the swarm comes out the queen will be captured by the cage. When the bees are in the air place a movable-frame hive in place of the box hive, setting the latter aside and turning its entrance in another direction. The swarm will return to the new hive in the old location as soon as it is apparent that the queen is not with the bees. In the meantime the queen should be taken from the queen cage, her wings be clipped, and, after putting her into an introducing cage, she may for a short time be placed in the entrance of the new hive. When most of the bees have returned and gone in she should be released in such a way that she will enter, by opening the introducing cage quickly and thrusting the open end into the entrance.

The old box hive may now be given attention. It is probably well filled with brood and honey, with some young bees. After puffing smoke into it, one side may be pried off and the combs be cut out and fitted into frames to go into the modern

hive, or they may be given to other colonies, but all queen cells found about the frames must be cut out unless it is desired that they should provide new queens to the hives receiving them.

After transferring a swarm and removing combs from a box hive it is well to clear away all bits of comb that may have been dropped and the hive itself should be taken away and burned, so as to leave nothing for the attraction of robber bees or bee moth.

#### TRANSFERRING COMBS TO FRAMES

Several frames should have thin strips of wood tacked lengthwise on one side and be placed, strips down, on a table or bench. The best combs from the box hive may now be placed on the frames and cut so that they will go in snugly, after which they should be secured with twine, and the frames, with strips and twine attached, be put with a colony of bees, either the transferred bees, or others. In a few days the old combs will have been secured in the frames with wax, by the bees, when strips and twine can be removed. The combs are valuable for strengthening colonies, if full of brood or honey and otherwise in good shape.

#### VARIETIES OF BEES

The honey bee is not a native of America. We have no member of the genus to which it belongs in this country. It was brought here by the early settlers, when it was unknown to the Indians except as the "White Man's Fly."

The first bees brought across the Atlantic were black or German bees, little bees that make a good white comb honey, but not as much of it as some more recently imported varieties. The bee is cross, too, and not very easy to handle, and is especially liable to the attacks of the bee moth. Some of the bees now taken from bee trees in this country are of this variety.

A yellow bee brought from Italy and known as the Italian has largely supplanted the black in the apiaries of commercial and expert beekeepers. It is a gentle bee that gathers large quantities of honey, does not swarm too much and, on the whole,

has proved the best general purpose bee we have. It defends its hive against the bee moth and is less subject to disease than the black. Mixtures of Italians and black are very common in the better beekeeping sections of the State.

A third variety known as the Carniolan because brought from Carniola, Austria, is gray in general color and in this respect somewhat resembles the black, especially when old and the down is rubbed off. It is very gentle and easily handled, and defends its hive as well as the Italian. It produces a beautiful white comb honey and keeps its colonies strong at all times. Its defect is a disposition to swarm too frequently. Expert beekeepers know how to control this in some degree, but the beginner is sure to be kept busy if he gets this variety. Next to the Italian it is, however, our most desirable sort.

Several other varieties have been introduced at one time or another, but the Italian still holds its own as the best bee for the beginner and for the commercial beekeeper as well.

#### THE FORMS OF BEES IN COLONY

If bees are examined in the fall or early spring, only two sorts of individuals will be found in the hive, namely, (1) many small, active bees with stings, which they will use promptly on provocation, and (2) a single, larger individual with lengthened body, also provided with a sting, but which is never used on the beekeeper even when the bee is picked up in the fingers. The small, active stinging bee is the worker, so-called. It does all the work both in the hive and out. It is a female bee, not developed to the point of laying eggs. The large individual is the only perfect female, the so-called, queen, who does nothing but lay eggs. (3) About swarming time a third form is produced in some numbers, namely a thick-bodied, large-eyed, male bee, without sting, commonly known as the drone, and so named by the ancient Romans and Greeks because they took the queen for a King and did not recognize the drones as the male bees. Seneca wrote during the early part of the first century, A. D.:

"Nature herself has conceived the idea of a King, as you may learn from various animals, and especially from bees, among whom the King's cell is the roomiest, and is placed in the most central and safest part of the hive; moreover, he does no work, but always employs himself in keeping others up to their work."

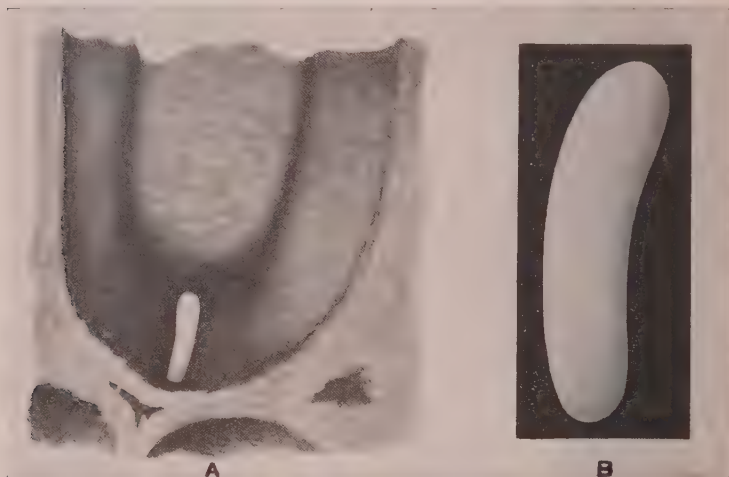


Fig. 3.—A, The egg of the Honey Bee as it appears in the bottom of a cell when the side is cut away; B, an egg more highly magnified.

#### THE LIFE-HISTORY OF THE HONEY BEE

An outline of the life-history of the three forms of bees in a hive is as follows:

The *queen* is produced in a large cell placed on the side or bottom of a comb. She emerges at the end of 16 days after the egg is laid, the egg stage lasting thru 3 of the 16 days. When queen cells containing grubs are observed in a hive, therefore, the beekeeper may know that a young queen will be out in less than 13 days and the bees will then swarm.

The *worker* is produced in small, ordinary cells, such as are used largely for storing honey. She emerges at the end of 21 days.

The *drone* is produced in large cells, in shape like worker cells, built near swarming time in odd corners, wherever the

workers can find room for them. The drone emerges at the end of 24 days from the laying of the egg.

#### LOCATION OF THE APIARY

Some judgment is necessary in locating an apiary, as will be understood by experienced beekeepers. It should be within sight of the residence of the owner if this is practicable. It must be in a place where it is least exposed to driving storms, particularly in winter. A hedge or grove of trees on the north and west is a desirable protection. A close fence or buildings may often be made to serve. An open grove of trees, or an orchard is a suitable place for the hives, when one is available. The apiary should not be placed near a hitching post nor close to a lot where stock is confined. The site should be well drained ground, never subject to overflow. The hives ought to be placed with the entrance south, southeast or east, in most localities. They should not be put on benches, or shelves, for the reason that they are not so easily lifted and examined as when close to the ground. But it is best to have something under the hives, brick, stone, or wooden frames, the latter home-made or manufactured, as may be preferred. A square, made by tacking strong six-inch fencing together makes a good support, or pieces of two-by-four studding can be used. The bottoms should be kept approximately level.

#### THE USE OF FOUNDATION

The sheets of wax foundation now used in hives are made of melted beeswax, and by the use of machinery impressions very much like the bottoms of cells are made on them, the impressions serving as a guide for the bees in making their cells. A full sheet of this foundation in a frame results in a very uniform comb all made of the small size worker cells and thus suitable either for brood or storing honey. In the brood chamber it is desirable that the comb be firmly secured so that in handling hives, especially in shipping them, combs will not break down. It is customary to use for these combs a heavy foundation that

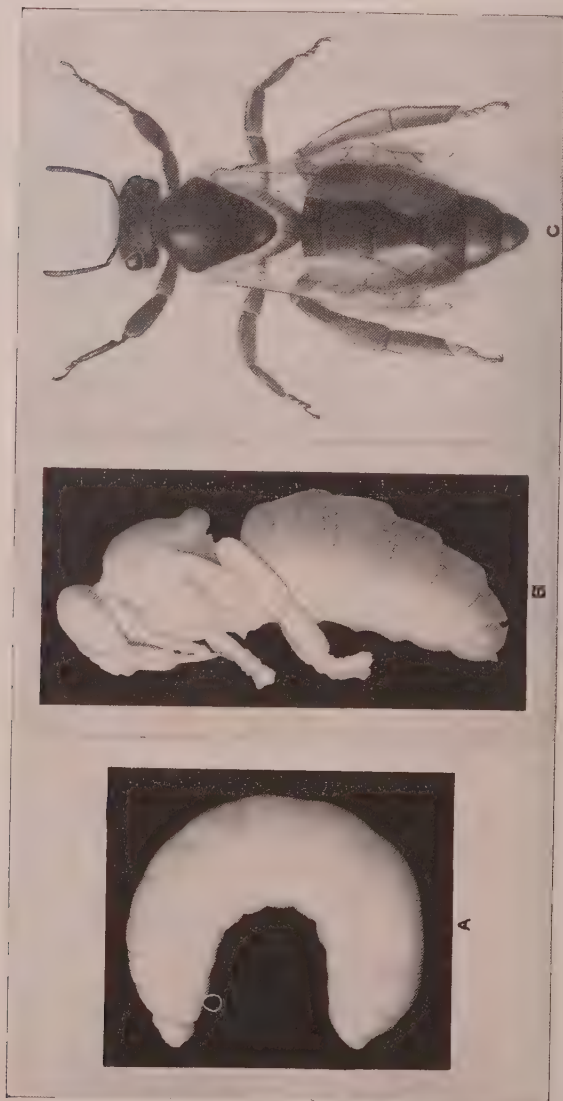


Fig. 4.—The Queen bee. A, her grub or larva; B, her pupa; C, the adult queen (Carniolan). Magnified.



Fig. 5.—The Worker bee. A, the grub; B, the pupa; C, the adult worker (Italian). Magnified.

would not be suitable for section and chunk honey, but is well adapted to brood rearing and for extracted honey. To further strengthen it the beekeeper is accustomed to run fine piano wire back and forth from side to side in the frames. More recently a better way of wiring, crosswise from top to bottom of the sheets, has been devised by manufacturers, so that the combs are kept very true in the frames and when completed are very strong. Some details with reference to putting the sheets in the frames may be obtained of dealers in supplies. Beginners are strongly advised to make use of these improvements in the production of combs, especially for brood rearing and extracted honey production. When any but full sheets of foundation are used the bees may not fill the lower corners of frames well and are then likely to build too many drone cells in these open spaces.

The foundation used in sections is not wired and is very thin. It is well to use it in order to get the combs made true in the sections and to encourage building out the corners. Sections so made are more attractive in appearance and sell better.

#### INTRODUCING QUEENS

The average beekeeper does not care to rear his own queens, tho commercial beekeepers sometimes find this worth while. But it is a simple matter to remove sealed queen cells found in hives and, putting them in guards of spiral wire such as are furnished by dealers, transfer them to hives without queens or to nuclei, so that the young queen can emerge and mate. The importance of having young and vigorous queens in colonies leads many bee men to get rid of the old ones at the end of two years, or sooner, and this requires the frequent introducing of new queens, a matter calling for some care, else the bees will destroy the strangers. When bees have been without a queen for forty-eight hours, however, they are generally ready to accept one if the matter of introducing her is handled properly. This may be done by puffing a little smoke in the entrance and narrowing the opening, then taking off the top and puffing a little more over the frames, when the queen in an in-

roducing cage is placed between two of the middle frames of the hive body. Some candy in one end of the cage supplies her with food in case the bees do not feed her, and they will after a time eat out this candy until she is released, but if not out at the end of 24 hours and the workers show a disposition to accept her she can be released by the beekeeper and allowed to run down between the frames.

#### THE ADVANTAGE OF CLIPPED QUEENS

It is a great convenience to have the wings of the queen bee clipped as soon as she has mated, so that she can be caught easily in case a swarm comes forth unexpectedly, for the old queen leads out the swarm, normally. When a clipped queen is present it is only necessary to set the old hive aside, put the new one in its place, then put the queen in the entrance, and when the bees have returned, move the new hive to another location, returning the old hive to its stand again. After a young queen is known to be laying actively, therefore, she should be taken from the hive and carried indoors, where the beekeeper's veil may be removed, and with fine, sharp scissors two-thirds of the wings of one side are cut off, care being exercised not to cut off a leg at the same time. She is then allowed to run down in the hive between the frames, after taking off the cover for a minute. An experienced beekeeper can clip the wings without taking off his veil and may do it at once after the queen is found. She will generally be discovered on one of the combs near the middle of the hive.

#### SWARMING

Bees swarm whenever the hive is full of brood and honey and there is a prospect for securing plenty of nectar. At such times they collect in masses on the outside of the hive, in the evening especially, and on a **bright** day about 10 o'clock or a little later the swarm comes out, workers rushing out of the entrance and circling about in the air until the queen comes also, when they rise and move from the hive a short distance to

settle in a dense cluster on the branch of a shrub or tree. After settling in this manner they remain for some time, generally for an hour or more, when if not hived they take the air again and move off in a direct course to the new home that has been



Fig. 6.—The Drone or Male Bee. Magnified.

selected by scouts, sent out in some numbers days in advance. It is hardly worth while to follow them after they have taken to the air the second time.

The thing to do is to get the cluster down and hive the swarm immediately after it has settled. A hive full of frames with full sheets of foundation should be at hand ready for the swarm. It is only necessary to cut off the branch with pruning shears, and shake the bees in front of the hive. If the queen is detected among the bees she may be caged and placed for a time in the entrance until the bees are largely inside, when she can be re-

leased. If it is desired to keep her at the head of the colony, her wings may be clipped before she is allowed to go in. If she is not worth preserving she may be destroyed and a better one introduced.

### THE PREVENTION OF SWARMING

Frequent swarming may be made a means of increasing the size of the apiary, but it is generally permitted at some loss of honey. The more the bees swarm the less surplus honey they will produce. This will be understood when it is remembered that the swarm that leaves must make comb for the storing of honey and the rearing of brood, and the wax used in building combs is produced at the expense of time and a consumption by the bees of a good deal of food. Then the old hive is left with only a few foraging bees, some young bees and a good deal of brood, all of which may require food. Besides, the young queen may not come from her cell for several days and afterward may not mate and begin laying for a week or more (3 to 10 days). The old colony is thus at a standstill so far as relates to gathering honey, at a season of the year when most of the surplus honey is generally collected. Hence experienced beekeepers try to prevent swarming during the honey gathering season and depend upon other means than natural swarming for increasing the number of their colonies.

Cutting out all queen cells when bees are getting ready to swarm has sometimes been suggested as a means of keeping a swarm from coming off, but is not a satisfactory practice by itself. Bees often build new queen cells as fast as they are cut out, if the colony is a strong one, and once the swarming fever takes possession of a colony it is generally best to allow it to swarm so as to avoid loss of time due to the bees hanging about the hives and doing nothing, as they certainly will after they make arrangements to leave. Before the bees get the notion they should be given more room in the hive for rearing brood and storing honey. Frames of honey or brood may be removed and given to weaker colonies, or new colonies be started with them. Frames with empty comb or full sheets of foundation

may be used in place of those taken out. Supers with foundation should be placed on the hive. When these things are attended to in season, swarming may generally be avoided and the bees be kept busy when their work is of most benefit to the beekeeper. The 10-frame hives here show to advantage, since they do not allow the colony to become crowded as quickly as does the 8-frame hive.

Some varieties, such as the Carniolan, swarm more often than others and are more difficult to handle on this account by the beginner. The Italians are much less disposed to swarm; and are consequently more easily handled by people with little experience in beekeeping.

#### FEEDING BEES

Bees like other domestic animals require feeding at times. As long as there is plenty of pasturage they can take care of themselves, and when it is abundant will demonstrate their capacity to provide even for the future, which cannot be said of any other animal man has adopted. There are times, however, when flowers become scarce, as when we have an excessively dry spell of weather, and bees may suffer for food if we have taken all their surplus from the hive. August is most likely to be such a period in Kentucky. In September, when the prevailing temperature becomes lower and fall flowers appear, strong colonies quickly recover and lay up all the food they need, even providing the beekeeper some surplus from the white aster. but if expected to do this they must not be robbed too closely. They may at times need all they can gather from fall flowers for their own use during the late fall and early spring months. If the body of a 10-frame hive is filled, however, at this season, what they put into a super may safely be taken by the beekeeper.

There are several ways of feeding bees without inciting them to rob one another. It should be done within the hive, always. The "Miller feeder" has served well at the Experiment Station when it was desired to give a colony all it needed quickly. It consists of a box that fits within a super, and has a slot along the bottom up which the bees may come from the frames, so

as to reach the sirup. The fluid is poured into the feeder toward evening, the super then being covered, and the bees, if in strong colonies and the weather is not too cold, take the sirup down in a night, while the bees of other colonies are not aware of what is going on. A second and better method consists in placing a bee escape board over the frames, the metal part being removed so as to leave only an oblong opening. A super is placed on the board over the hive and after filling two-thirds full of sirup a friction-top can with small holes made in the lid, it is inverted over the opening in the board. The hive top is placed over the super and the bees soon carry the sirup down and store it in the combs. The latter is a good way to stimulate the bees in spring when they are a little short of stores just before fruit bloom is open. It has been used by us also in feeding small colonies when preparing them for queen rearing. A ten-pound can of this sort inverted on the frames, within a super, is a satisfactory means of feeding in the fall, in place of the Miller feeder.

Quite often feeding is best done by simply putting in a hive several frames of honey, taken from colonies that have more than they need. It is perhaps the best of all ways to help a weak colony.

#### WHAT TO FEED

Equal bulks of granulated sugar and water make a satisfactory sirup for much of the feeding called for. Two quarts of water are put into a kettle and brought to the boiling point, then the kettle should be moved from the fire and the two quarts of sugar be stirred slowly into it. Perhaps it may be necessary to return it to the fire again if the sugar does not dissolve completely, but it must not be scorched, and should be kept stirred with a stick or glass rod until it is ready. After cooling, but while still a little warm, the sirup may be given to the bees. A thicker sirup is sometimes used, but the equal-bulk preparation will answer for most of the feeding to be done.

Feed only when the weather is mild enough to make the bees active; if it becomes cold they will not take the sirup quickly.

**WINTERING BEES**

At the north bees keep well when stored in cellars, but in Kentucky where the winters are not steadily cold they may become active in January and February and must be so kept that they can at times get out of the hives. Most of our beekeepers leave the hives on the summer stands, and this can be safely done provided the situation is not completely exposed to cold winds, and some packing is put about the hives. Commonly it is only necessary to leave a shallow super on the hive body,



Fig. 7.—Wax foundation vertically wired, with one longitudinal wire near the bottom. (Courtesy of Dadant and Sons.)

filling it with chaff, fine excelsior, or crumpled paper, placing, of course, the metal top over this. When further protection is desired, a wooden winter cover may be used. This can be bought of dealers, and consists of a side piece that goes about the hive body leaving a little space between to be filled with dry packing, and a telescope cover that comes well down over the side piece leaving some room between it and the top and sides of the hive for packing. Protection beneath the hive is not ordinarily considered necessary, tho some experienced beekeepers insist that all sides of the hive should be covered in some fashion to prevent loss of heat.

The entrance of the hive should be contracted greatly as cold weather comes on in the fall, and generally during the winter an opening four or five inches wide by about a half inch deep should be left.

The packing should be put on the hives after the bees are inspected and found provided with enough stores to carry them

thru the winter. Late September or early October when the weather is good is the time to feed and make everything snug. The hives will not require further attention after this until the bees begin to get nectar in the spring, when they should be inspected again to see if they need feeding and have good queens.

Where large store boxes can be obtained cheaply they can be made to cover several hives placed close together and covered with excelsior, dry leaves, straw or other packing. A piano box has been used for the purpose, three hives being placed side by side in a box, then covered with dry leaves, the front of the box being secured so as to leave a place for the bees to come out in case of warm winter weather.

#### PACKING HIVES IN TARRED PAPER COVERS

The cost of winter covers and packing cases has led recently to the use of double-ply tar-paper, which is made in rolls three feet wide.

A wooden frame of strips two inches wide is first placed about the bottom of the hive, the side pieces being four inches longer than the length of the hive, the cross pieces measuring four inches more than the width. The front strip rests on the side pieces of the bottom board, leaving open beneath it a way to the hive entrance. The pieces are secured to each other with single nails at their ends, the front and hind pieces being above the others. When this frame is in place the telescoping cover of the hive is removed, leaving the wooden inner cover on the frames and a piece of tarred paper is cut, long enough to go about the hive and frame of strips and to overlap at one side, where it is secured with nails. When the hive is thus enclosed the paper extends some inches above the top. The lower edge of the paper is now secured to the frame of strips by pieces of lath tacked on the outside and the space between paper and the walls of the hive is filled with sawdust, shavings, dry leaves, or crumpled paper, until it reaches a depth on the cover of eight or nine inches. The upper edge of the tarred paper may now be folded over the packing and secured, after which a second piece of paper is cut, long enough to fold over the whole, to be

held in place by nails and by placing the telescope cover on top of it. Brick or stones on the cover will keep it from being blown off during the winter. An opening must be cut opposite the hive entrance to furnish some air and to permit the bees to come out during spells of mild weather. Such tarred paper covers may be made to last several seasons if they are removed, straightened out and put away, in the spring of the year. In large apiaries

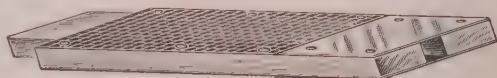


Fig. 8.—A Miller queen introducing cage. (Courtesy of the G. B. Lewis Company.)

it is customary to avoid labor by placing two, or four, hives close together and covering them with the tarred paper.

Bottom packing is not commonly used, and is not desirable unless precautions are taken to keep it from absorbing moisture from the soil.

Winter covers need not be removed until after the bees have been out gathering pollen from maples, elms and willows. But they are in the way when it becomes necessary to get into the hives to look for the queen, and may be removed after the weather becomes steadily warm. The covers should then be stored in a dry place for use the following winter.

### ROBBING

When provisions in hives run low and there is no outside source from which the bees can get more, strong colonies are likely to invade the hives of weak ones and carry away the little the latter have. Small colonies may at such times be utterly destroyed by robbers, unless the beekeeper takes a hand and by some means puts a stop to the robbing. It is difficult to control when well under way and knowing this the wise bee man takes every precaution he knows to keep his bees well supplied with food during trying times so that they will be strong enough to defend their stores and not be tempted to rob neighboring colonies. Good beekeepers are careful, also, about leaving bits

of honeycomb lying about the hives, and when feeding is necessary, see to it that the sirup does not drip about the entrance or run down on the bottom board. Any exposure of sweets at such times is likely to attract hungry bees and get them in the notion of stealing. Opening hives is to be avoided when there is a scarcity of nectar, for the same reason. When there is an abundance of flowers about, the hives may be opened and the bees and brood be inspected without danger.

If when examining a colony, robbing begins, as it may very suddenly, the hive should be closed at once and grass or hay be thrown over the entrance and left there for several hours. By the end of that time the excitement will generally have subsided.

Sometimes robbing starts quietly without the knowledge of the beekeeper. When it is detected, the hive from which the robbers come may be traced by dusting flour on the bees going in and out of the hive being robbed. When the robbers have been traced the two hives may be exchanged, the hive of the robbers being placed on the stand of the weak colony, the weak one being given the place of the robbers.

On the whole, robbing is best controlled by looking after all colonies in advance, and strengthening them so that they will neither rob nor submit to being robbed. Nowadays it is often more dangerous to rob than it is to be robbed, because many weak colonies are affected with foul brood, and robbing is certain to carry this disease to the very strongest of colonies.

#### BEE DISEASES

Two diseases of bee brood are greatly to be feared. They are known as American and European Foul Brood, respectively, both bacterial diseases.

*American Foul Brood* affects the bee grubs in the cells and attacks queen, worker and drone grubs, but sometimes also the pupae. The grubs, in health, are glistening, white, plump bodies, all looking alike except in size. When this disease attacks the grub, as a result of being fed tainted honey, perhaps brought by robbing bees from a diseased colony, its color changes to yellow,

later to brown, and it lies extended in the bottom of the cell. When a toothpick or splinter of wood is thrust into one of these dead grubs it comes away with a gluey thread attached, the substance of the insect having been converted into a sticky slime, sometimes of a disagreeable odor. This characteristic odor is to be detected in badly diseased colonies as soon as the hive is opened, but it is not safe to depend on it for the recognition of the disease. Colonies are in a condition to convey the disease to others long before the odor is recognized, so that its detection must be by sight, and it requires good eyes to find the few diseased grubs sometimes present.

*European Foul Brood.* This disease is not regarded with as much dread as the American Foul Brood, but may become very persistent and troublesome unless looked after. It is believed to be caused by a different micro-organism. The young grubs are attacked before the cells are capped and the caps become sunken finally. The grubs are slightly transparent in the first stages of the disease, later becoming gray or yellow. When dead the tissues of the body do not become viscid, and a bit of wood thrust into a grub does not bring away a thread of slime. The odor is not commonly offensive. It attacks the grubs of queens, workers and drones.

*Treatment for Foul Brood.* Treatment should be attempted only when there is plenty of nectar about, so that robbing may not be encouraged. An old practice consists in setting the hive aside and brushing all bees from the combs in front of a hive with narrow strips of foundation in the frames. The old combs are then taken away and burned with everything in them. At the end of 4 days the bees will have built out the strips of foundation and have used all of the honey they took from the old hive, and may then be given full sheets of foundation and a new queen. A little feeding within the hive may be desirable at this time to help them along until they get well started again. Such colonies will frequently fill their brood chamber before fall and show no trace of the disease. It may return, however, in case diseased colonies are in the neighborhood, and the fact that it does return must not in all cases be ascribed to ineffective-

ness in the treatment. The old hive ought to be scraped out and the inside be burned over with a blast lamp or else be thoroly saturated with about two per cent of formalin in water. This fluid may be sprayed over both the inside and outside of the hive, the cover and bottom board included, which should then be closed and set away until it gradually dries out.

The Hutzelman method recently recommended and claimed to be very effective consists in immersing the infected combs for some hours in a twenty-per-cent solution of formalin in alcohol.



Fig. 9.—An apiary belonging to Mr. John Reese, of Winchester, Ky.



Fig. 10.—The apiary represented in Fig. 9, with hives packed in wrappers of tarred paper.

Tanks holding the fluid are employed, so that the disinfectant can be drained from the combs and be used more than once. The alcohol is more likely to penetrate all crevices of the comb than is a watery fluid, an advantage claimed for this preparation by those selling it.

When colonies have been long neglected and are very badly affected with either disease they may sometimes be burned with everything in them. This applies especially to box hives and bee gums. If one hopes to succeed with bees at the present time he cannot afford to spend time experimenting with anything but movable-frame hives.

#### BEES AS POLLINATORS OF FRUITS AND VEGETABLES

The important part taken by the honey bee in conveying the pollen of blossoms from one plant to another is coming to be appreciated more and more as we learn about the necessity for the crossing of many kinds in order to get good crops. Varieties are often more or less self-sterile, and may thus fail to set crops almost completely if there is no opportunity for insects to get to their blossoms. When apples and other fruits bloom during cool rainy weather, when the bees and other insects fly but little, the crop of fruit is likely to be light as a result of imperfect pollination. Hence a few colonies of bees about an orchard are a great help to the fruit grower, even if he has little use for the honey they make. In fact, he cannot afford to be without them unless he has beekeeping neighbors.

#### BEEKEEPING AS A VOCATION OR AVOCATION FOR WOMEN

A good living can be made in some parts of Kentucky by keeping bees for honey. Women can conduct such a business as well as men if they can get help during the time of greatest rush, in May and June. The lifting of many heavy hives at such times may be too much for some of them, but with help, then, an apiary is entirely within their capacity, and becomes a healthful occupation and recreation besides. Queen rearing as a business for women is even better than honey production because

it calls for nice work in transferring the grubs to wax cups, and the like, which because of their smaller hands and experience in using them for delicate work, women are likely to do with more skill than men. The inexperienced are advised, however, to begin moderately, with a few colonies, and work into apiculture gradually, only letting other things go completely when sure of themselves.

#### KENTUCKY BEE PLANTS

The experienced beekeeper knows that it is not worth while to attempt beekeeping for profit in a region not provided with an abundance of nectar-producing flowers. One of the first questions asked by people thinking of coming to Kentucky to engage in the business is, what bee forage is there in Kentucky? We have about everything of value occurring in the Eastern United States, as the list given below will show. It is important for the beekeeper to know when to expect the important flowers and the list has been made in four groups covering the important periods of honey gathering during the season. The beekeeper watches the flowers closely and has his supers ready to put on the hives at a day's notice, for the bees can, when in good condition, fill a super provided with comb in three or four days, and will fill one provided with full sheets of foundation in a week or ten days. But the brood chamber must be full of brood and honey in the first place. If kept strong the bees will attend to this during the period when fruit (peach, plum, apple and cherry) is in blossom, and at any rate should finish it during the locust blooming period in May. When the fruit blossoms are very plentiful and the weather good, the colonies may fill the brood chamber from them and lay up some fine surplus honey from black locust blossoms which come a little later. At latest they should be able to gather surplus for supers when the white clover season arrives. This is our most important honey-producing plant, and in our extensive pastures it is often very abundant. If the beekeeper fails to get surplus during this early part of the season his chance is generally gone until September and October, when the goldenrods and asters bloom. But if the

bees have been robbed closely, or the early season has been especially unfavorable, the colonies may need all they gather in the fall. If they have enough stores of their own from spring and summer gathering, very good honey for the market may be gathered after the first of September. Most of the plants mentioned below are common in Kentucky. The names of important species are printed in *italics*. The periods of blooming range somewhat with the season, and in some cases the same plant is repeated in two groups because of this range.

#### GROUP 1.—MARCH AND APRIL

The plants of Group 1 are much more important than we are likely to think. They furnish pollen in quantities when the bees first leave the hives in the spring. This food is necessary for brood rearing and an abundance of it is always a good omen for a successful season. The soft and red maples are the first in bloom, sometimes beginning in the middle of February. The elms furnish quantities of pollen from about the middle of March to the middle of April. Pussy willows are in bloom in the latter part of March, when the bees go wild over the catkins. None of our early pollen producing flowers seem to be liked so well. If the combs are examined during these months they are likely to show numbers of cells packed with pollen, whitish, yellow and bright red, as if there was disposition to deposit the pollen of each flower species by itself. The plants of this period are the following:

*Soft maple*, red maple, *elms*, *willows*, sugar maple, *peach*, Japanese plums, strawberry, *pear*, *hawthorns*, *blackberry*, red-bud, *dandelion*, Carolina poplar, many wild flowers.

#### GROUP 2.—MAY AND JUNE

The spring surplus is gathered from flowers blooming during May and June, generally, most of it from black locust, white clover, yellow sweet clover, basswood, or from sourwood.

*Apple*, *plum*, *pear*, *cherry*, wild black cherry, blackberry, raspberry, hawthorn, strawberry, *tulip poplar*, willows, elder,

*black locust, white clover, yellow sweet clover, alfalfa, crimson clover, vetches, basswood, sourwood, shad-bush, dandelion.*

#### GROUP 3.—JULY AND AUGUST

This may prove a trying period, since August is often hot and dry, conditions leading to a lack of nectar in such plants as are in bloom during this month.

White clover, yellow sweet clover, *white sweet clover*, *alsike clover*, cucumbers and cantaloup, smartweeds, *buckwheat*, milkweeds, Indian currant (*Symphoricarpos orbiculatus*), mints, teasel, partridge pea, soy-bean, sumachs, button-bush, Spanish needles, thistles, iron weed, bonesets, Jo-pye weed, sunflowers.

#### GROUP 4—SEPTEMBER AND OCTOBER

We frequently have a long fall season, extending at times to December, during which the bees may gather a good deal of surplus honey from the white aster (*Aster ericoides*) and from Spanish needles in some localities. The plants available for surplus honey are *golden rods, asters, sunflowers, Spanish needles.*

#### KENTUCKY WEATHER

The synopsis of Kentucky weather following is based upon records covering a period of about 40 years. Its study will explain the reasons for the schedule of practice suggested. For example, the beekeeper cannot expect to do much with his hives out-of-doors during January, when the mean temperature may be 27° F., and the mercury may go as low as —14° F. In February the average conditions are much as in January. March weather is better, but still, on an average, unfavorable to work out-of-doors, and it is best most seasons to wait until April before beginning active handling of the colonies. December is another unfavorable month, as a rule. So the practical man will do well to count only on the months April to November, inclusive, for work with his bees out-of-doors. Of course many things can be done indoors during the more inclement months in

getting hives, supers, and other appliances, in good shape, and in extracting and marketing the crop of honey.

**KENTUCKY TEMPERATURE BY MONTHS**  
For About 40 Years—U. S. Weather Bureau Records

MONTH	Range of Mean Temperature, Degrees, Fahrenheit	Minimum, Degrees, Fahrenheit	Maximum, Degrees, Fahrenheit
January	27—44	—14	72
February	23—45	—20	75
March	36—54	—1	85
April	45—62	15	88
May	58—71	30	93
June	69—77	40	99
July	73—80	51	102
August	70—80	46	100
September	64—73	32	98
October	50—65	21	89
November	38—53	2	78
December	25—45	—9	71

**A SCHEDULE FOR THE BEE SEASON IN KENTUCKY**

**March**

If the weather is unfavorable to opening hives, let them alone. Some feeding can be done during forward seasons.

**April**

Inspect for queens and stores. Clip queens when not already done. Feed colonies, if with too little stores.

**May**

Remove packing. Give water in pans or troughs set about hives.

**June**

Place supers on hives. Cut out queen cells and place in nuclei for reserve queens.

**July**

Remove supers full of honey. Clean sections and put away in cases. Extract honey. Requeen colonies if they have old or undesirable queens.

**August**

Feed where necessary. Finish requeening. Prevent robbing.

**September**

Place supers on hives for fall flow of honey.

**October**

Remove supers. Inspect and feed when necessary. Narrow entrances to hives. Pack for the coming winter.

**November**

Packing can be done during this month if it has been neglected in October.

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**Books on Beekeeping**

The Honey Bee, Langstroth. Published by Dadant and Sons, Hamilton, Illinois.

The A B C and X Y Z of Bee Culture. Published by the A. I. Root Company of Medina, Ohio.

Beekeeping, by Dr. E. F. Phillips. Published by the Macmillan Company, New York City.

Queen Rearing Simplified, by Jay Smith. Published by the A. I. Root Company, Medina, Ohio.

**Journals on Beekeeping**

Gleanings. Published by the A. I. Root Company, Medina, Ohio.

The American Bee Journal. Published by Dadant and Sons, Hamilton, Illinois.

**Manufacturers and Dealers in Beekeeping Supplies**

The A. I. Root Company, Medina, Ohio.

C. H. W. Weber and Company, Cincinnati, Ohio.

Wilson and Wilson, 206 E. Market Street, Louisville, Kentucky.

G. B. Lewis Company, Watertown, Wisconsin.

Dadant and Sons, Hamilton, Illinois.

The Carter Supply Company, 267 W. Short Street, Lexington, Kentucky.

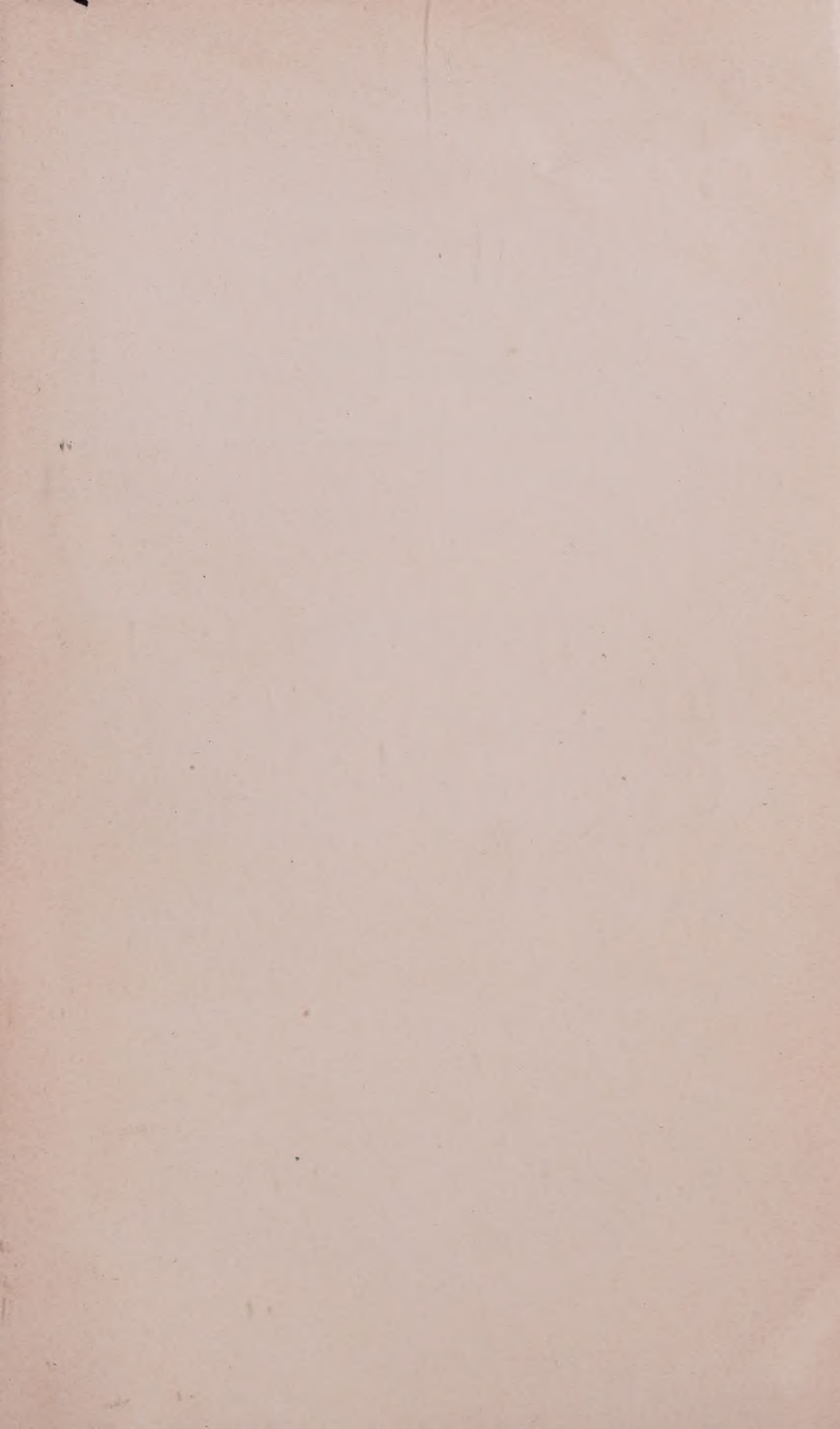
**Dealers in Queens**

J. P. Moore, Morgan, Kentucky.

A. I. Root Company, Medina, Ohio.



Fig. 11.—Queen rearing nuclei in the apiary of J. P. Moore of Morgan, Ky.





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